CASE STUDY SUMMARY

Energy management system (EMS) provides enhanced information on store energy use and demand response capability.

- Participant: Albertsons
- Building Type: Grocery Store
- Number of Stores: 300
- Load reduction capability: 7.5 MW
- 2004 load reduction: 6 percent
- Primary Benefit: EMS data facilitates energy efficiency upgrades

Albertsons can shed 7.5 MW of peak demand though enhanced lighting controls.

Effective energy management systems are key to allowing a retailer to respond appropriately to fluctuating electricity supplies and prices. Grocery retailer Albertsons uses enhanced automation controls to monitor energy use and respond to price fluctuations and reliability events, reducing energy expenses while maximizing return from its energy efficiency investment. Using the corporate wide area-network and solutions from EnerNOC, Albertsons can quickly reduce lighting load in response to energy shortages, and to participate in demand response programs. Additionally, Albertsons' energy management systems help the company to track energy use, enhance store processes, and sustain ongoing energy savings.

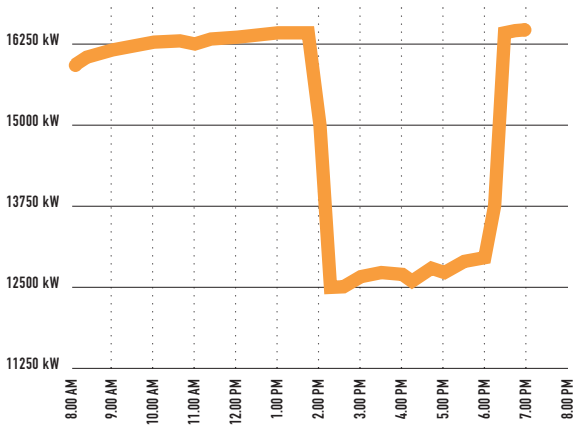
- Narrow profit margin
- Refrigeration is 50% of electric energy usage
- Must maintain product shelf life

PROBLEM

In many ways, supermarkets are at a disadvantage when participating in demand response programs. They operate on a narrow profit margin, and refrigeration is the largest component of their electric energy usage. Grocery chains like Albertsons must maintain product shelf life and meet health codes governing product temperature, so quickly shedding refrigeration load is difficult.

Despite new computer controls that operate refrigeration systems more efficiently, energy costs remain one of the highest expenses of a grocery store. Additionally, Albertsons is highly motivated to participate in demand response because reliable energy services are important for preventing product loss and ensuring customer access.

Demand Savings at Albertsons



The above graph illustrates the demand reduction Albertsons can achieve using enhanced automation technology at 300 stores.

- Install energy monitoring systems and track energy use
- Implement energy efficiency measures
- Dim overhead lighting by 35%

SOLUTION

To shed load and save on energy costs, Albertsons installed energy monitoring and control systems. Overhead lighting can be dimmed by 35 percent – a noticeable reduction. Nonetheless, customer and staff comments are rarely received. System costs of $3.3 million were partially covered by $1.8 million in grants utility incentives.

Albertsons worked with two different notification systems during the past five years. In 2003–2004, Albertsons used an Internet-based system that required programming, but allowed instantaneous response to pricing signals and curtailment needs. In 2005, Albertsons signed up for the California Power Authority Demand Reserves Partnership and agreed to curtail a pre-defined load upon request. EnerNOC customized a demand response system utilizing Albertsons' existing energy management system. In addition to providing automated network control to shed load and verify response, EnerNOC manages all risks associated with enrollment and nominated curtailment levels. The EnerNOC Network Operating Center was implemented at no cost to Albertsons and the two parties share revenue from participating in the Demand Reserves Partnership. The EnerNOC solution can be implemented with a wide variety of energy management systems and is appropriate for large and small chains.

"Enhanced automation has helped in our broader attempt to manage energy use. We now have great visibility of our energy usage data and can detect and act on trends. The tracking allowed by these systems is key – we can sustain our energy savings as we do our part in curtailing demand."

—Glenn Barrett, Albertsons Senior Energy Manager

Jack Fong
Albertsons Store Director

"Our customers get a well lit store – through daylighting and current energy efficient lights. Behind the scenes, we know that our automated systems turn off lights when they are not needed."

—Jack Fong, Albertsons Store Director

- EnerNOC manages demand response operations
- Energy monitoring system informs store process enhancements, ongoing energy savings, and peak demand reduction

BENEFITS

In addition to helping Albertsons be a good neighbor, enhanced automation provided Albertsons with comprehensive information about store energy use. The energy monitoring systems enabled Albertsons' management team to make effective energy and cost-saving changes. For example, Albertsons launched a corporate initiative for energy efficient lighting systems, upgraded lamps and electronic ballasts, added motion sensors, and lowered lighting levels. Albertsons has saved approximately 300,000 megawatt hours since the energy retrofit program was established in 2000.

Time-specific and ongoing energy usage data helped Albertsons to make operational and process enhancements, allowing the company to make peak demand reductions as well as achieve baseline energy savings. Lighting demand can be shed regardless of weather conditions, providing substantial and dependable savings. Reducing lighting in one Albertsons store can result in a constant 26.5 kW reduction. As a result of the successful demand response test, Albertsons expanded the program to 300 stores.

Aggregation results in significant benefits from load curtailment. Most Albertsons stores receive power from an alternative supplier through Direct Access. The remaining stores are bundled through a regulated utility. Albertsons food stores are on appropriate time-of-use rate schedules.

PROJECT SITE DESCRIPTION

- Location: 300 stores in California
- Size: 14,000,000 ft^2
- Space Function: Grocery distribution and sales
- Site Contact: Glenn Barrett, Albertsons Senior Energy Manager

Equipment Installed

- Com-Trol Energy Management Control System
- Engage Networks Inc. Ethernet Pulse Input Module
- Utility Data Management System
- High-speed data communication lines
- Data line and Ethernet communications card

Energy Management Service Provider

- EnerNOC

Energy Usage

- Summer peak demand: 110 MW
- Curtailable peak load: 7.4 MW
- Project cost: $3.3 million
- Project incentives: $1.8 million

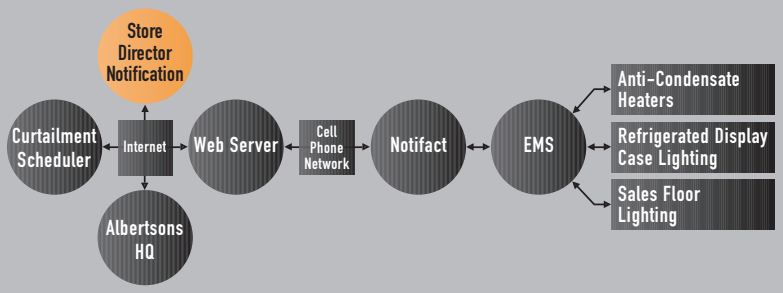
Other Benefits

- Readily available information on store usage data
- Information on trends in energy usage at the end use level
- Tracking of energy efficiency improvements

Technical Information

In 2004, Albertsons used enhanced automation technologies to control lighting and anti-sweat heaters and demonstrated load reductions of 5.4 MW at 264 supermarkets throughout California. Recent expansion of the program is increasing the number of participating stores and load reductions. Albertsons uses its corporate wide-area network (WAN) and the Internet to send price and behavior signals to each store's energy management control systems (EMCS). The EMCS can then send signals to dim the lights by up to 50 percent and to turn off the anti-sweat door heaters. This allowed an Oakland location store to achieve a demand shed intensity of up to 0.75 watts per square foot.

Schematic of Albertsons Wireless Curtailment System



The Energy Information System (EIS) is an Internet protocol input/output device from Engage Networks Inc. called the E-PIM™ (Ethernet Pulse Input Module). The E-PIM™ receives signals from Albertsons' corporate WAN and then interacts with a proprietary protocol EMCS called the Com-Trol. The Com-Trol EMCS then sends out predetermined shed commands based on the incoming signal. For example, the Oakland store participated in a California Energy Commission Automated Demand Response research project and had two shed levels based on an incoming $/kWh price signal. As the $/kWh signals increased, the EMCS was programmed to increase shed intensity. The first shed level was a $0.30/kWh price signal that triggered a shed strategy to dim overhead lighting by 35 percent. The second shed level occurred when the cost of electricity reached $0.75/kWh. This level triggered an additional shed strategy that turned off the anti-sweat door heaters. During the highest price signal, the Oakland store was able to shed up to 10% of its whole building power. Further information on the demand response research is available in

Development and Evaluation of Fully Automated Demand Response in Large Facilities, M. A Piette, O. Sezgen, D. Watson, N. Motegi, (LBNL), C. Shockman (Shockman Consulting), L. ten Hope (CEC), CEC-500-2005-013, January 2005, http://drrc.lbl.gov/drrc-pubs1.html#project.

The E-PIM™ Energy Information System is also a valuable energy measuring and monitoring system for Albertsons. It provides Albertsons' energy managers with minute interval electric data accessible from the Internet and daily and monthly consumption charts. The data is presented in graphical charts that provide calendar profiles, three dimensional profiles, and duration curves. This allows the energy managers to compare and rank energy performance in all participating supermarkets.

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TAKING THE NEXT STEP

A list of certified demand response contractors is available at: www.energy.ca.gov/demandresponse/documents/qualified_firms.html

Free resources are available from the California Energy Commission at: www.energy.ca.gov/enhancedautomation/

- Business Case Guidebook
- Technical Options Guidebook
- Case Studies
  1. Alameda County
  2. Hewlett-Packard
  3. Comerica Building
  4. Foothill-De Anza Community Colleges
  5. Staples, Inc.
  6. Doubletree Hotel Sacramento
  7. Albertsons
  8. Arden Realty/next>edge
  9. Contra Costa County
  10. Hilton, Palm Springs
  11. PETCO
  12. Swinerton Inc.

Research on Demand Response:

- http://drrc.lbl.gov/drrc-1.html

Additional Resources:

- www.fypower.org/now/demand_resp.html
- www.sdge.com/business/drp_index.shtml
- www.pge.com/biz/demand_response/
- www.sce.com/RebatesandSavings/LargeBusiness/DemandResponse/